MARK BOX		
PROBLEM	POINTS	
1	10	
2	10	
3	10	
4	10	
5	10	
6	10	
7	10	
8	10	
9	10	
10	10	
%	100	

NAME: _____

SSN: _____

please check the box of your section below

☐ **Section 003 (MW 9:05 pm)**

or

☐ **Section 004 (MW 10:10 pm)**

INSTRUCTIONS:

(1) To receive credit you must:
   (a) **work in a logical fashion, show all your work, indicate your reasoning**
   (b) when applicable put your answer on/in the line/box provided
   (c) if no such line/box is provided, then box your answer

(2) The MARK BOX indicates the problems along with their points.
Check that your copy of the exam has all of the problems.

(3) You may **not** use a calculator, books, personal notes.

(4) During this exam, do not leave your seat. If you have a question, raise your hand. When you finish: turn your exam over, put your pencil down, and raise your hand.

(5) This exam covers (from *Calculus* by Anton, Bivens, Davis 8th ed.):
Sections 8.1 – 8.5, 8.7, 8.8 .

Problem Inspiration: see solution key (If I told you here, you wold know what method to use.)

Solutions will be available on the course homepage later this afternoon.

Hints:

(1) **You can check your answers to the integrals by differentiating.**

(2) **+ C**

(3) **For more partial credit, box your $u - du$ substitutions.**

1.

$$\int \sec^3 x \tan^3 x \, dx \; =$$

2.

$$\int \ln(1+x)\,dx \;=$$

3.

$$\int \cos^2(3x)\,dx \;=$$

4. $\int \frac{dx}{\sqrt{x}\,(1+x)} =$

Hint: $1 + x = 1 + (\sqrt{x}\,)^2$

5. $\int x^2 e^{(-2x)}\, dx \;=$

6.

$$\int \frac{dx}{\sqrt{3+2x-x^2}} =$$

Hint: complete the square.

7.

$$\int \frac{x^2}{x^2 - 3x + 2}\, dx \;=$$

Hint: bigger bottoms?

8. Use the trapezoidal rule, with $n = 6$ subintervals, to approximate the integral

$$\int_2^5 \sqrt{x-1}\, dx \ .$$

ANSWER: T_6 is equal to:

You only have to do arithmetic as far as I indicated in class.

9. Recall the Trapezoidal Error Bound Theorem: If f'' is continuous on $[a, b]$ and if K_2 is the maximun value of $|f''(x)|$ on $[a, b]$, then

$$\left| T_n - \int_a^b f(x)\,dx \right| \;\leq\; \frac{(b-a)^3 K_2}{12n^2}\ . \tag{11}$$

Use formula (11) to find an upper bound on the error in problem 8.

Answers:

$K_2 =$

$\left\lvert T_6 - \int_2^5 \sqrt{x-1}\,dx \right\rvert \;\leq$

You only have to do arithmetic as far as I indicated in class.

10. $\int_1^\infty \frac{dx}{x} =$

Work logically and clearly so that I can see that you see what is going on. Explain your answer.